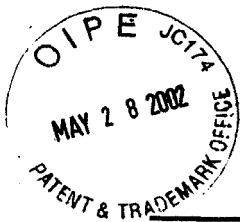


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TECHNOLOGY CENTER 2800

VIA-IN-PAD WITH OFF-CENTER GEOMETRY

Applicant: Phil Geng et al.
Serial No.: 09/751,614

18. (Amended) A substrate comprising:

a plurality of lands, each land having a geometric center, wherein each land has a via therein that is offset with respect to the geometric center of the land; and

a plurality of solder balls, each solder ball adhering to a respective one of the lands, each solder ball adhering to the entire respective land.

19. The substrate recited in claim 18, wherein each land has an edge, wherein each via has a geometric center, and wherein the geometric center of each via is in a region between the geometric center and the edge of its associated land.

20. The substrate recited in claim 19, wherein the geometric centers of vias of adjacent lands are offset in substantially the same direction.

21. (Amended) An electronic assembly comprising:

an integrated circuit package having a plurality of contacts;

a substrate having a plurality of lands, each land having a geometric center and an edge, each land having a via therein, each via having a geometric center in a region between the geometric center and the edge of its associated land; and

a plurality of solder balls, each coupling one of the plurality of contacts to a respective one of the plurality of lands, each of the solder balls contacting substantially the entire respective land to the edge of such land.

22. The electronic assembly recited in claim 21, wherein each via inhibits a thermally expansive substance residing in the vias from causing adjacent contacts of the integrated circuit package to be bridged when the lands and contacts are subjected to heat.
23. The electronic assembly recited in claim 22, wherein the thermally expansive substance comprises a volatile organic compound.
24. The electronic assembly recited in claim 22, wherein the thermally expansive substance comprises a volatile liquid that forms a portion of a material from the group consisting of a solder mask, a solder flux, a solder paste, a solvent, and a via cap.
25. The electronic assembly recited in claim 21, wherein the lands comprise a first group having vias offset in a first direction, and a second group having vias offset in a second direction.
27. (Amended) The electronic assembly recited in claim 21, wherein the geometric centers of vias of adjacent lands are offset from the geometric centers of such lands in the same direction.
28. (Amended) An electronic system comprising an electronic assembly having:
an integrated circuit package having a plurality of pads,
a substrate having a plurality of lands, each land having a geometric center and an edge, each land having a via therein, each via having a geometric center in a region between the geometric center and the edge of its associated land; and
a plurality of solder balls, each coupling one of the plurality of pads to a respective one of the plurality of lands, each of the solder balls contacting substantially the entire respective land to the edge of such land.

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29. The electronic system recited in claim 28, wherein each land has a geometric center and an edge, wherein each via has a geometric center, and wherein the geometric center of each via is in a region between the geometric center and the edge of a land.
30. The electronic system recited in claim 29, wherein the geometric centers of vias of adjacent lands are offset from the geometric centers of such lands in the same direction.
31. The substrate recited in claim 18, wherein each land has an edge defining a perimeter, and wherein each solder ball covers the entire respective land, including the perimeter of such land.
32. The substrate recited in claim 18, wherein each land has an edge defining a perimeter, and wherein each solder ball adheres to the entire respective land to the perimeter of such land.
33. The substrate recited in claim 18, wherein each land has an edge and a surface defined by the edge, and wherein each solder ball adheres to substantially the entire surface of the respective land.
34. A substrate comprising:
a plurality of lands, each land having a geometric center, wherein each land has a via therein that is offset with respect to the geometric center of the land; and
a plurality of solder balls, each solder ball adhering to a respective one of the lands, each solder ball adhering to the entire respective land without any material intervening between the solder ball and the respective land.
35. The substrate recited in claim 34, wherein each via has a geometric center, and wherein the geometric center of each via is in a region between the geometric center and the edge of its associated land.

36. The substrate recited in claim 34, wherein the geometric centers of vias of adjacent lands are offset in substantially the same direction.

AMENDMENT AND RESPONSE UNDER 37 CFR § 1.111

Serial Number: 09/751,614

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Please add the following new claims:

31. (New) The substrate recited in claim 18, wherein each land has an edge defining a perimeter, and wherein each solder ball covers the entire respective land, including the perimeter of such land.

32. (New) The substrate recited in claim 18, wherein each land has an edge defining a perimeter, and wherein each solder ball adheres to the entire respective land to the perimeter of such land.

33. (New) The substrate recited in claim 18, wherein each land has an edge and a surface defined by the edge, and wherein each solder ball adheres to substantially the entire surface of the respective land.

34. (New) A substrate comprising:
a plurality of lands, each land having a geometric center, wherein each land has a via therein that is offset with respect to the geometric center of the land; and
a plurality of solder balls, each solder ball adhering to a respective one of the lands, each solder ball adhering to the entire respective land without any material intervening between the solder ball and the respective land.

35. (New) The substrate recited in claim 34, wherein each via has a geometric center, and wherein the geometric center of each via is in a region between the geometric center and the edge of its associated land.

36. (New) The substrate recited in claim 34, wherein the geometric centers of vias of adjacent lands are offset in substantially the same direction.